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Book of Abstracts

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16:00-16:30	Dr. Saloua MERAZGA (**O1**) **Properties of Mg2-x Alx Ni(x = 0, 0.1, 0.2, 0.3) alloys prepared by mechanical alloying for electrochemical hydrogen storage** *Research Center Semiconductor Technology for Energetic, Algiers, Algeria*	***Keynote talk*** Dr. Oleksandr Tkach (**I6**) **Aliovalent Doping Engineering in SrTiO3-based Electroceramics** *Department of Materials and Ceramic Engineering, CICECO – Aveiro Institute of Materials, University of Aveiro, Aveiro, 3810-193, Portugal*
16:30-17:00	***Keynote talk*** Dr. D. Pukazhselvan (**I28**) **Catalyzed magnesium hydride for clean energy storage applications** *TEMA, Department of Mechanical Engineering, University of Aveiro, Portugal*	Diogo Lopes (**O36**) **Oxide thermoelectrics prepared by laser melting: effects of processing atmosphere** *CICECO - Aveiro Institute of Materials, Department of Materials and Ceramic Engineering, University of Aveiro, 3810-193 Aveiro, Portugal*
17:00-17:30	Allan J. M. Araújo (**O40**) **Proteic sol-gel synthesis of Gd-doped ceria electrolytes** *Materials Science and Engineering Postgraduate Program, UFRN, 59078-970, Natal, Brazil*	Dr. Mónica Silva (**O28**) **Cellulose acetate/Iron oxide nanocomposite films: synthesis, characterization and RB5 removal** *2C2T-Centre for Textile Science and Technology, University of Minho, Campus de Azurém, 4800-058, Guimarães, Portugal*
18:00-18:30	Francisco J. A. Loureiro (**O38**) **ZnO-modified BZY upon different B-site locations** *Centre for Mechanical Technology and Automation, Mechanical Engineering Department, University of Aveiro, Aveiro, 3810-193, Portugal*	Dr. Gabriel Constantinescu (**O37**) **Electrical performance tuning in thermoelectric Ca3Co4O9 materials by transition metals additions** *CICECO – Aveiro Institute of Materials, Department of Materials and Ceramic Engineering, University of Aveiro, 3810-193, Aveiro, Portugal*
18:30-19:00	**Conference Closing Ceremony**	

O36. Oxide thermoelectrics prepared by laser melting: effects of processing atmosphere

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Thermoelectric materials can convert waste heat into electrical energy, thus contributing to the sustainable energy technologies. Traditional thermoelectric materials, despite their good performance, suffer from two main problems, the toxicity/scarcity of the elements used and their stability in harsher work conditions like high temperatures or non-inert atmospheres. Thermoelectric oxides appear to be a promising alternative due to natural abundance of the constituents and high thermal stability [1]. This work focus on the processing of these materials using the Laser Floating Zone (LFZ) technique, with particular emphasis given to laser processing under various redox atmospheres, allowing unique opportunities for tuning the structural, microstructural and thermoelectric properties [2], including growth of fully dense fibres, formation of metastable phases and/or promoting different oxidation states by adjusting the growth conditions. Here we report the processing of model manganite- and titanate-based materials including donor-substituted $Ca(Pr)MnO_3$ and $Ti(Ta)O_2$ systems. The results suggest successful incorporation of the dopants in the structures of the base material. Electrical conductivity studies and microstructural characterization of the $Ca(Pr)MnO_3$ samples indicate the formation of core-shell structures with different resistivities. These core-shell structures are not always desirable and may negatively affect the transport properties, as observed when compared to the $Ti(Ta)O_2$ system. This work shows how these structures can be tuned or eliminated by a posterior thermal treatment. XRD/SEM/EDS studies demonstrate some guidelines for tuning the phase composition and microstructure by adjusting the growth rate under different redox conditions. We report high power factor values of 303 $\mu Wm^{-1}K^{-2}$ at 1120 K for the $Ca(Pr)MnO_3$ system [3] and 317 $\mu Wm^{-1}K^{-2}$ for the $Ti(Ta)O_2$ system. The obtained guidelines suggest that LFZ is a suitable technique for processing thermoelectric oxides, if optimized control over growth parameters and re-equilibration conditions is imposed.

References

[1] J. He and Y. Liu, “Oxide thermoelectrics : The challenges , progress , and outlook,” 2011.
[2] N. M. Ferreira, M. C. Ferro, and M. A. Valente, “Unusual redox behaviour of the magnetite/ hematite core–shell structures processed by the laser floating zone method,” pp. 5646–5651, 2018.
[3] F. P. Carreira, N. M. Ferreira, and A. V Kovalevsky, “Laser processing as a tool for designing donor-substituted calcium manganite-based thermoelectrics,” *J. Alloys Compd.*, vol. 829, p. 154466, 2020.